

**Tellect®**  
CONNECTING THE FUTURE®



**19" LINXS  
LIGHTWAVE INTEGRATED CROSS-CONNECT SYSTEM  
USER MANUAL**

109003  
Issue A Rev 2

19" Lightwave Integrated Cross-Connect System (LINXS) User Manual

Document Number 109003

Issue A Rev 2

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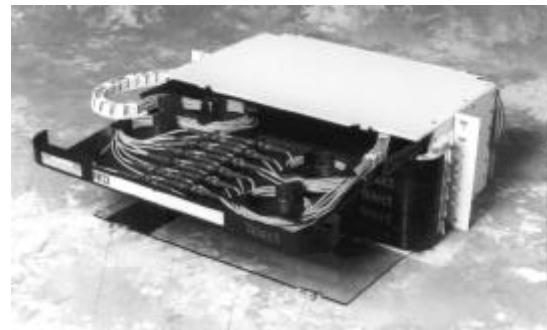
# 1

# *Descriptions*

## **19" LINXS**

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LINXS (Lightwave Integrated Cross-Connect System) is an advanced, integrated fiber optic cable management system. It provides a central location for fiber splicing, patching, and storage. It includes shelves, trays that mount into the shelves, and accessories.



Telect engineered the 19" LINXS for private network and CEV environments or for any application where 19" equipment racks are standard. However, the 19" LINXS can also be installed in 23" racks.

### **Basic Options**

- LINXS shelves come in three sizes—one, three, or six trays.
- Shelves come with or without trays installed.
- There are six tray types—left patch, right patch, splice, total front access (TFA) patch, TFA splice, and storage. A shelf can hold a mix of these trays.
- Splice pads specific to different splice methods are available.
- Adapters, connectors, cable assemblies.

### **Other Options**

- Wall-mounting brackets
- Filler panel (covers empty rack space and protects equipment)

- Working tray (mounts to the front of the LINXS shelf)
- Industry standard pigtails, patch cords, and multifiber cable assemblies
- Preterminated patch trays
- K2 Post&Gate cable management components
- Extender panels
- Preterminated shelves
- Multifiber cable assemblies
- Cable management products

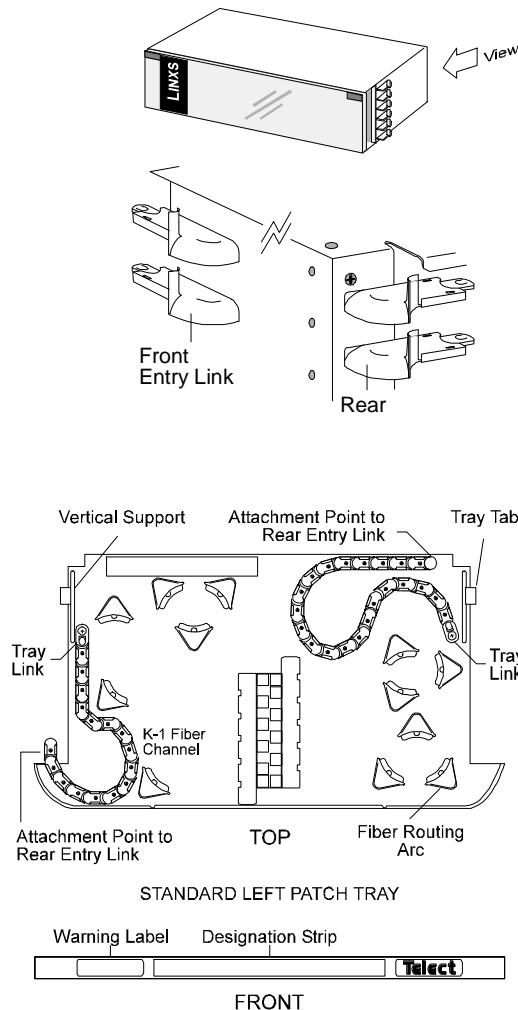
## MAIN ASSEMBLIES

Each shelf consists of a metal chassis, front and rear access door, and cable management components. The shelf comes with two reversible rack-mounting brackets and mounting screws (eight 12-24 and eight 6-32 screws) for use with either 19" or 23" equipment racks.

The cable management components on the shelf consist of front and rear Entry Links, which provide bend-radius control for cable into the LINXS shelf, and attachment points for the K1 Fiber Channel in the trays. ⇒

Trays include Fiber Routing Arcs, two K1 Fiber Channels, K1 Gate Clips, flexible tubing (splice trays only), Patch Plate (patch trays only), designation strips, and warning label.

Each tray type has a unique configuration of Fiber Routing Arcs and K1 Fiber Channels. The following drawing shows components for a standard left Patch Tray. See cabling instructions in "Installation" for component location for specific tray types. ⇒



## **INSTALLATION CONSIDERATIONS**

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Telect engineered the 19" LINXS for private network and CEV environments or for any application where 19" equipment racks are standard. However, the 19" LINXS can also be installed in 23" racks.

## **INSPECTION**

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Compare the contents of the 19" LINXS shipping container with the packing list. Call Telect if anything is missing.

### *NOTE*

*Telect is not liable for shipping damage.*

*If the shipping container is damaged, keep it for the carrier's inspection. Notify the carrier and call Telect's Customer Service Department:*

*1-800-551-4567 or 1-509-926-6000*

*Keep the container until you have checked equipment operation. If you experience any kind of problem, call Telect's Customer Service Department. Use the original, undamaged container if you are instructed to return the 19" LINXS to Telect.*

## **Equipment to be Installed**

- LINXS shelf and trays
- Cable clamp kit
- Splice mechanism

- Splice pad appropriate for splice method
- Adapters (for patch trays)
- Pigtails or patch cords (for patch trays)
- *Optional*—K2 Post & Gate cable management components
- *Optional*—3/8" heat-shrink tubing (for outside plant cable to splice tray)
- *Optional*—Wall-mount brackets

*NOTE*

*Contact a Telect Customer Service Representative if you need to order any of the parts listed above or parts listed in "Basic Options" or "Other Options" in Section I, Descriptions:*

*1-800-551-4567 or 1-509-926-6000*

*If you order cable clamp kits (PN 027-1000-1001 through 1005) and K2 Post & Gate (PN 027-0000-2000) cable management components, specify rack or shelf clamping, and if shelf, front or back.*

## Required Tools

- Cable stripper
- Kevlar cutter
- Screwdrivers—Phillips and small flathead
- Buffer tube stripper

# INSTALLATION PROCEDURE

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## Mounting to a Rack

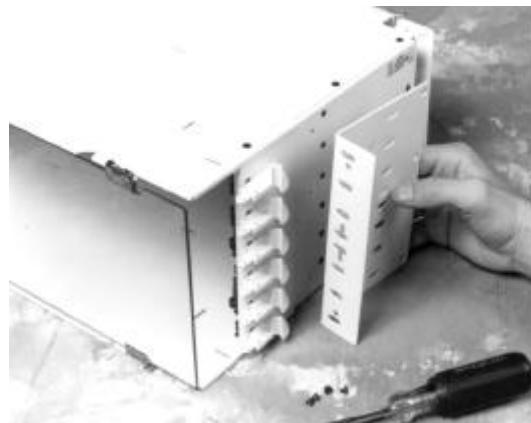
The two mounting brackets can be reversed, making it possible to mount the shelf to either a 19" or 23" equipment rack.

*NOTE*

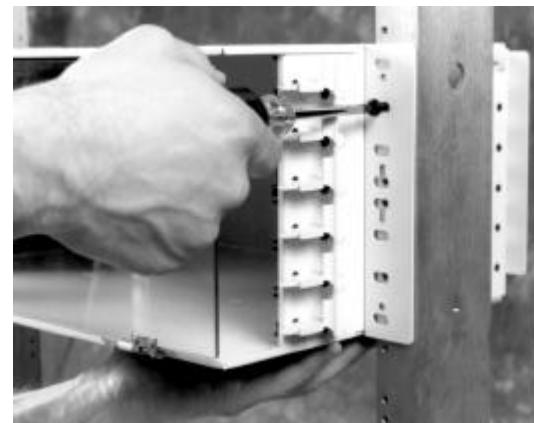
*If possible, mount the shelves intended for splicing between 20" and 50" (51–127 cm) from the floor for easy access and central location.*

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Step	Action
1.	<b>19" Rack</b> —Attach the <i>broad</i> side of both mounting brackets to each side of the shelf using four 6-32 screws.  <b>23" Rack</b> —Attach the <i>narrow</i> side of the brackets to each side of the shelf.  <i>See photo A.</i>
2.	Attach the shelf to the rack using four 12-24 mounting screws on each side. <i>See photo B.</i>



A



B

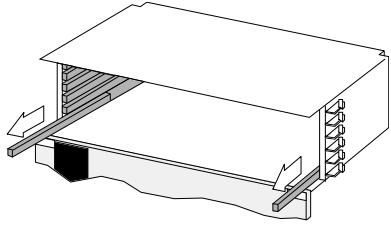
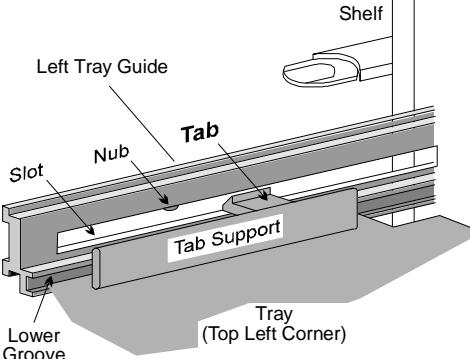
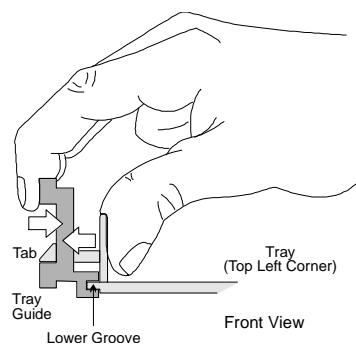
## Mounting to a Wall

You need the wall-mount brackets for this installation.

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Step	Action
1.	Attach the wall-mount brackets to the shelf using the screws supplied with the bracket kit.
2.	Hold the shelf against the wall and mark the locations of the mounting holes.
3.	Attach the wall anchors to the wall at the marked locations.
4.	Anchor the shelf to the wall.

## Fiber Tray Installation

Step	Action
1.	Open the front shelf door by pulling outward on the spring-loaded latches at the top. ⇒
2.	Fully extend the tray guides. ↓
	
3.	Position the nose of the left tray tab into the middle of the tray guide slot, behind the nub, where the slot is the most expandable. ⇒
	
4.	Snap the tab into the tray guide slot by squeezing the tray guide against the support between the thumb and forefinger. This may require a moderate amount of force. ⇒
	

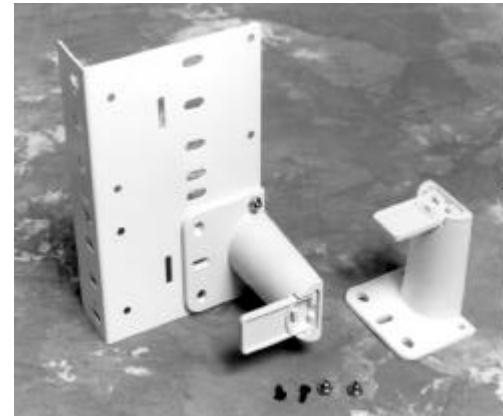
### NOTE

*It will not be possible to snap the tab into position near the ends of the tray guide, nor exactly next to the metal shelf, where the slot is not expandable.*

5. Bend the end of the right tray guide out sufficiently (about 1/4") to position the nose of the right tray tab into the slot of the tray guide.
6. Repeat Step 4 on the right side of the tray.
7. Close tray fully and confirm that it seats properly.

## Cabling the Rack

K2 Posts & Gates can route, protect, and store fiber cable on racks. The racks can be 19" or 23", and unequal-flange or equal flange with extender panels. K2 Posts & Gates mounted back-to-back on extender panels that are attached to any kind of rack can serve as storage spools.

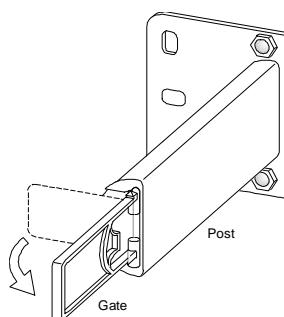



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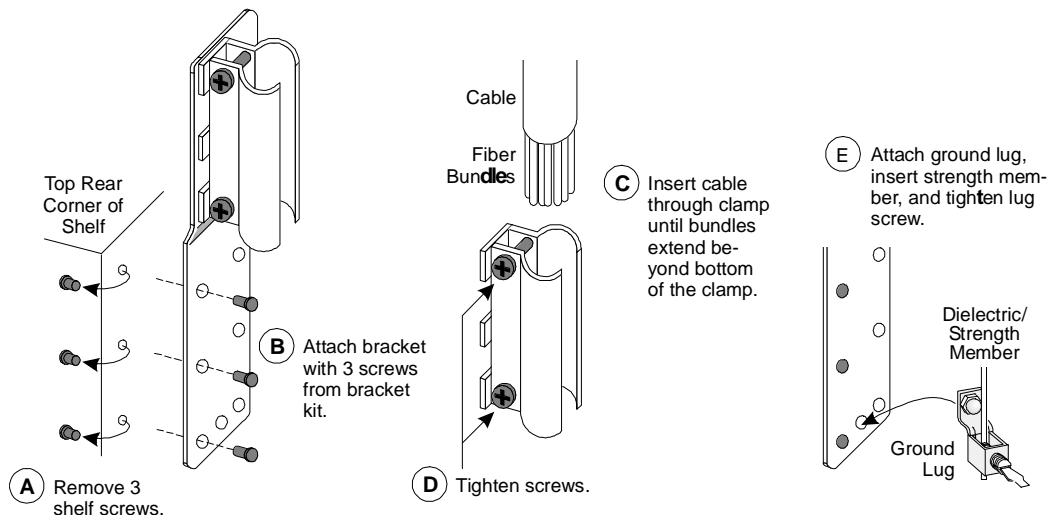
Step	Action
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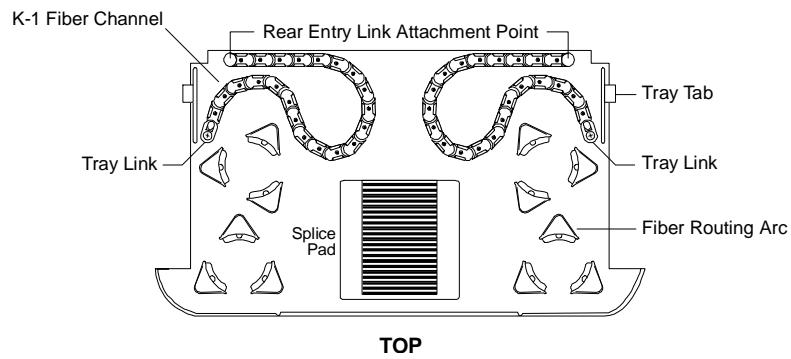
1. Snap open the K2 gates. 
2. Route fiber cables over the K2 posts.
3. Close the K2 gates to retain the cables.



4. Use cable clamps to attach loose-tube and breakout fiber cable to the rack or to the LINXS shelf. This photo shows shelf clamping; the drawings below show how to attach and use the clamp.



## Standard Splice Tray Cabling (PN 026-0010-xxxx)



### NOTE

*Although the splice tray is removable, Telect does not recommend removing it when splicing cables. Ensure that each splice tray contains the correct splice pad for the splicing method.*

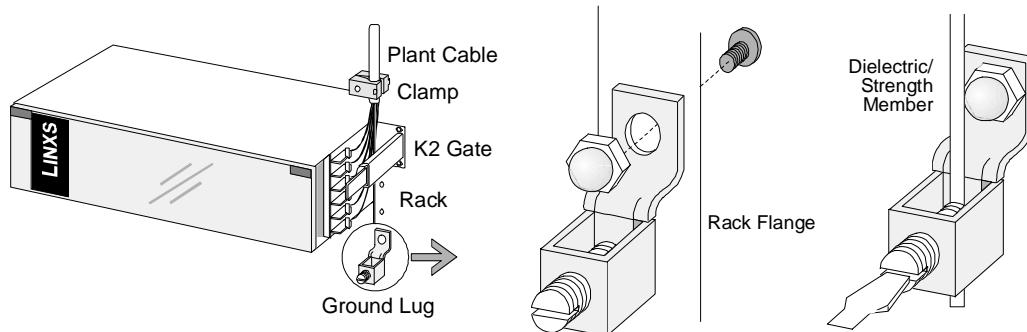
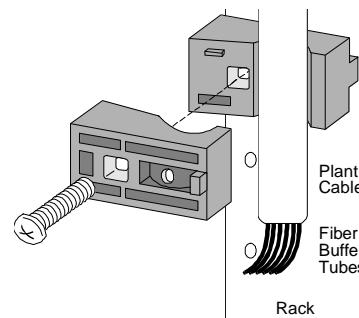
This subsection shows the cabling procedure for splicing outside plant cable to twenty-four 2 mm fiber pigtailed inside the LINXS tray. You can follow a similar procedure and sequence for cabling and splicing to 900  $\mu\text{m}$  pigtailed. However, if you use 3 mm pigtailed, one tray will accommodate only 12 splices.

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Step	Action
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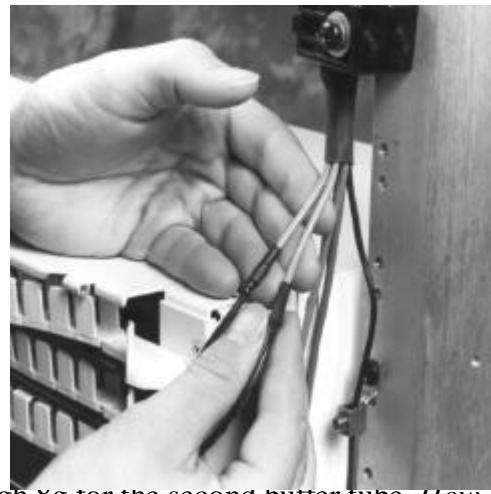
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1. Remove 76" (193 cm) or more of the outer jacket and kevlar from the cable.
2. Clean off the cable.
3. Cut off the central strength member to 16" (40 cm) from the cut end of the outer jacket.
4. Bring the cable to the back of the panel and secure it with a cable clamp.  $\Rightarrow$
5. Attach a ground lug (provided in the clamp kit) to the rack at least 5" (13 cm) from the clamp.  $\Downarrow$



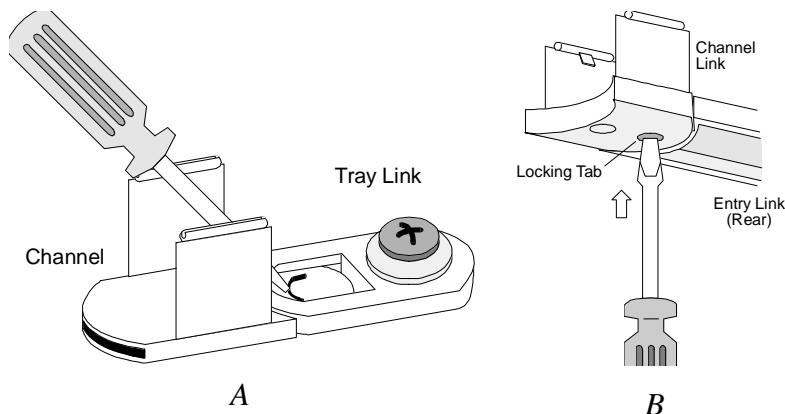
6. Insert the strength member into the ground lug, tighten the lug firmly, and cut off the excess length.  $\nearrow$
7. Remove the 6-foot length of flexible tubing and the K1 Gate Clips from the splice tray.
8. Outside plant cable requires the application of flexible tubing to the 6- or 12-strand fiber bundles in place of the stiffer buffer tube:
  - a. Extend the buffer tube from the cable clamp to the Entry Link on the rear corner of the LINXS shelf.
  - b. Cut the buffer tube jacket 2 inches (5.1 cm) before the Entry Link and remove it from the cable.

- c. Clean the gel from the fiber strands and apply talcum powder, if desired, to reduce friction.
- d. Cut the flexible tubing in half.
- e. Feed the fiber strands through one piece (about 3 feet or 0.91m) of the flexible tubing.
- f. Slide the flexible tubing over the end of the buffer tube with 1/2" (1.5 cm) of overlap. The flexible tubing should fit tightly over the buffer tube.  $\Rightarrow$
- g. *Optional*—Apply 3/8" (0.95 cm) heat-shrink tubing (not provided) to further secure the flexible tubing to the buffer tube.
- h. If necessary, repeat Step 8a through 8g for the second buffer tube. *However, do not repeat Step 8d* (do not cut the flexible tube in half again).



9. Remove the K1 Fiber Channel from the side of the tray that will receive this incoming cable.
  - a. With the tray open, detach the channel from its Tray Link by lifting up on the locking tab of the link with a small screwdriver and pulling off the channel. *See drawing A.*
  - b. With the tray closed, detach the channel from its Entry Link:

Push a small screwdriver into the last small hole underneath the attachment point to release the locking tab, then pull the channel from the link. *See drawing B.*

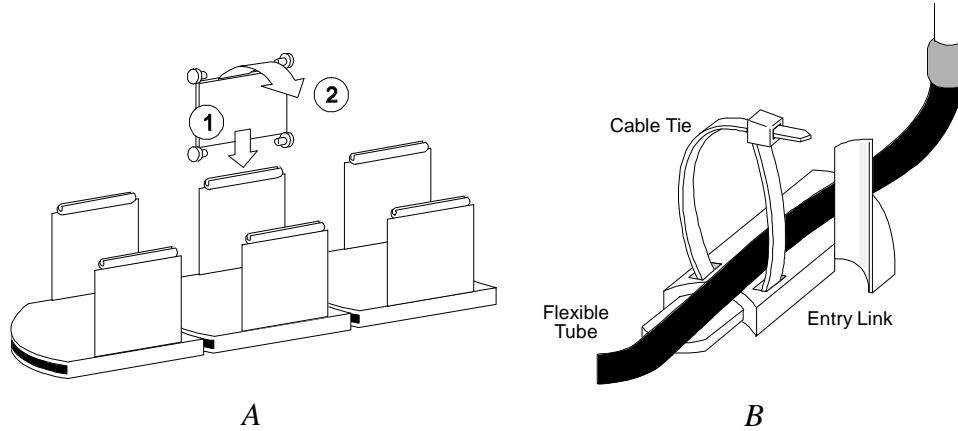


- c. Remove the channel from the tray.

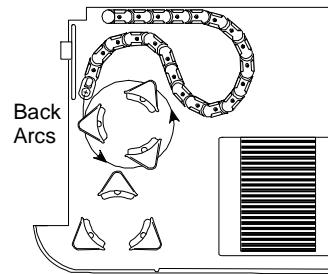
10. With the tray closed, place the flexible tubing containing the fiber strands

into the K1 Fiber Channel, and attach K1 Gate Clips to one in every three or four links to secure the tubing within the channel. *See drawing A.*

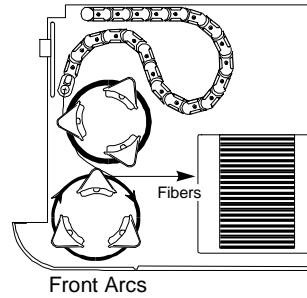
11. Secure the flexible tubing to the rear Entry Link with a cable tie threaded through the slots in the link. *See drawing B.*



12. Reattach the K1 Fiber Channel to the rear Entry Link and place the channel into the back of the tray.
13. With the tray open, reattach the K1 Fiber Channel to its Tray Link.
14. Route the flexible tubing in the tray by wrapping it around the Fiber Routing Arcs in the back of the tray a few times in a circular pattern, *counterclockwise*. Secure the tubing with cable ties through the slots in the arcs. ⇒



15. Now wrap the remaining tubing *clockwise* around the front Fiber Routing Arcs at least three times. This leaves enough fiber for repeated splice attempts. ⇒



#### NOTE

*Fiber Routing Arcs ensure the proper bend radius.*

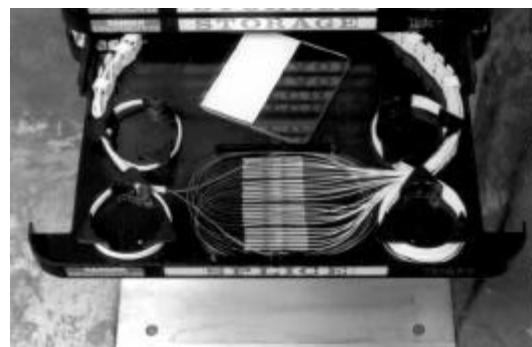
16. Route the fibers to the splice pad (*see the illustration for Step 15*).
17. Repeat Steps 9 through 13 for the pigtails which enter the other side of the splice tray.

18. Route the pigtails across the first Fiber Routing Arc and secure them with a cable tie.
19. Flexible tubing is not necessary for pigtails. However, remove the jacket from the pigtails where they extend beyond this cable tie point.
20. Wrap the pigtail fiber strands around the routing arcs several times (to leave fiber for future splicing) in a figure-eight or circular pattern.
21. Now fiber can be spliced and stored:

*NOTE*

*From the rear of the splice pad to the front, each splice requires about 1/4" more fiber length than the previous one.*

- a. Guide two fiber strands (cable and pigtail) into the rearmost splice position and adjust their length so that after being prepared, spliced, and wrapped, they will lie neatly across the splice tray.
- b. Remove the fiber strands to the splice table.
- c. Prepare the fiber, then splice according to the splice manufacturer.
- d. Place the completed splice into the splice pad.
- e. Repeat Steps a through d for the remaining splices, working forward from the rearmost position.
- f. After the splices are complete, wrap the slack fiber around the spools.

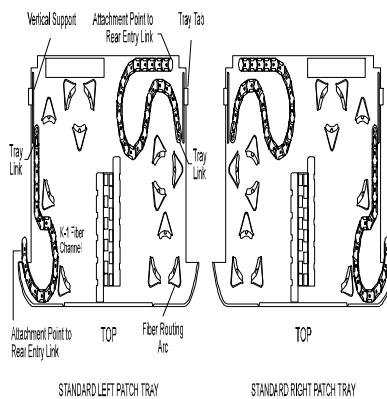


22. Secure the fiber strands to the Fiber Routing Arcs with cable ties through the slots in the arcs.
23. Identify each splice on the designation strip in the tray and/or on the strip on the front of the tray.
24. Replace the plastic splice compartment cover and close the splice tray.

## Standard Patch Tray Cabling (PN 026-0021-xxxx, Left) (PN 025-0022-xxxx, Right)

### NOTE

You can purchase LINXS patch trays with or without adapters. Specify adapters—Select stocks most of the industry standards—even when you order trays without them to ensure proper-sized mounting holes.

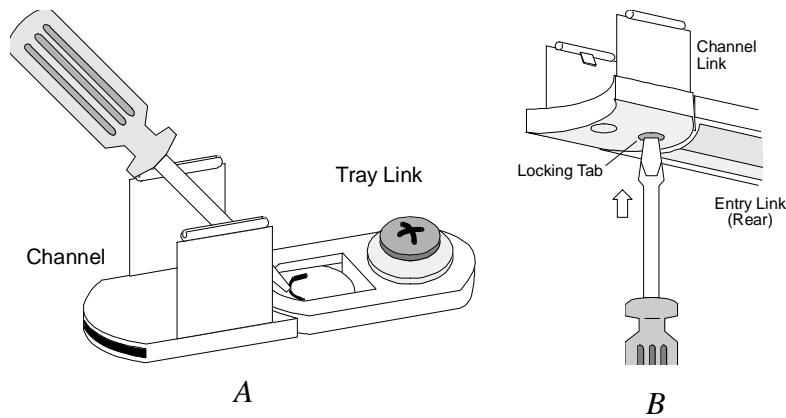



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### Step Action

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1. Open the patch tray.
2. If adapters are installed, go directly to Step 3.  
To install adapters:
  - a. Remove the four Phillips screws that secure the patch plate to the tray, then pull out the plate.
  - b. Mount the adapters on both sides of the patch plate with the slots all facing upward.
  - c. Secure the patch plate in the tray by reinstalling the four screws.
3. Remove the rear K1 Fiber Channel from the tray.
  - a. With the tray open, detach the channel from its Tray Link by lifting up on the locking tab of the link with a small screwdriver and pulling off the channel. *See drawing A, next page.*
  - b. With the tray closed, detach the channel from its Entry Link:  
Push a small screwdriver into the last small hole underneath the attachment point to release the locking tab, then pull the channel from the link. *See drawing B, next page.*



c. Remove the channel from the tray.

4. With the tray open, connect the pigtails or patch cords from one side of the tray to the adapters, beginning with frontmost patch position and routing the fiber to accommodate cable length.

*NOTE*

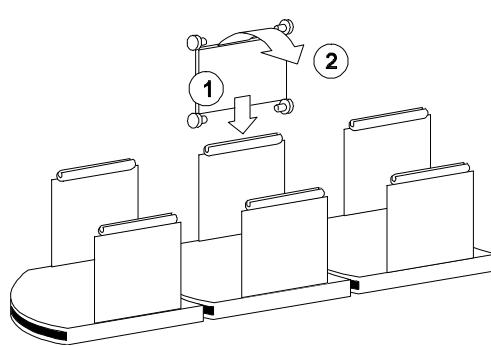
*If a Fiber Routing Arc interferes with cable routing, it may be removed. Use a Phillips screwdriver to remove the screw holding the arc from underneath the tray.*



5. Continue to load the patch cords or pigtails from the one side of the tray in a similar manner until they are all connected, routing the fiber cable for the rearward positions as shown. ⇒
6. Place the fiber cable into the K1 Fiber Channel.
7. Reattach the channel to the Tray Link.



8. Attach K1 Gate Clips to one in every three or four links to secure the cable within the channel. *See drawing A.*
9. Route the K1 Fiber Channel through the back of the tray. *See photo B.*



A



B

10. With the tray closed, reattach the K1 Fiber Channel to its rear Entry Link.
11. Detach the forward K1 Fiber Channel on the other side of the tray, from its front Entry Link as in Step 3b.

*NOTE*

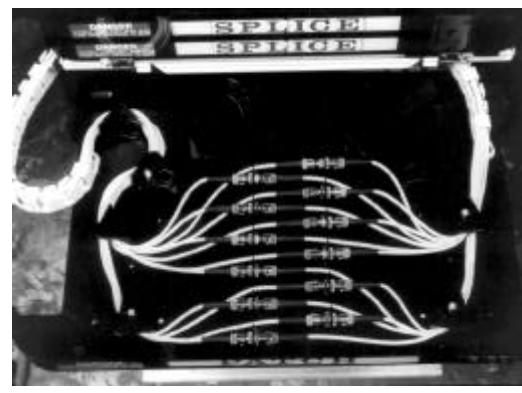
*It is not necessary to remove this channel from the Tray Link in order to load the pigtails or patch cords on this side.*

12. Connect the patch cords or pigtails from this side to the adapters, working from the front to the back.
13. Place the pigtails or patch cords from this side into the K1 Fiber Channel and attach K1 Gate Clips to one in every three or four links to secure them. *See photo A.*
14. Reattach the channel to the front Entry Link.

A completely cabled patch tray looks like *photo B*:



A



B

15. Remove the designation strip from the front of the tray, identify each patch using either side of the strip, and replace the strip.  $\Rightarrow$
16. Close the patch tray.



## TFA Splice Tray Cabling (PN 026-0060-xxxx)

### NOTE

*Although the splice tray is removable, Telect does not recommend removing it when splicing cables.*

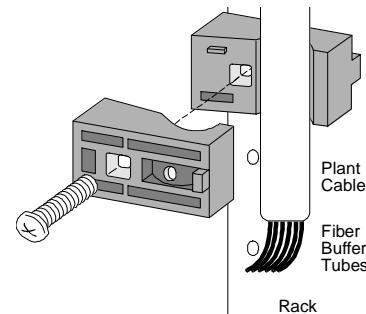
*Ensure that each splice tray contains the correct splice pad for the splicing method.*

This subsection shows the cabling procedure for splicing outside plant cable to twenty-four 2 mm fiber pigtails inside the LINXS tray. You can follow a similar procedure and sequence for cabling and splicing to 900  $\mu\text{m}$  pigtails. However, if you use 3 mm pigtails, one tray will accommodate only 12 splices.

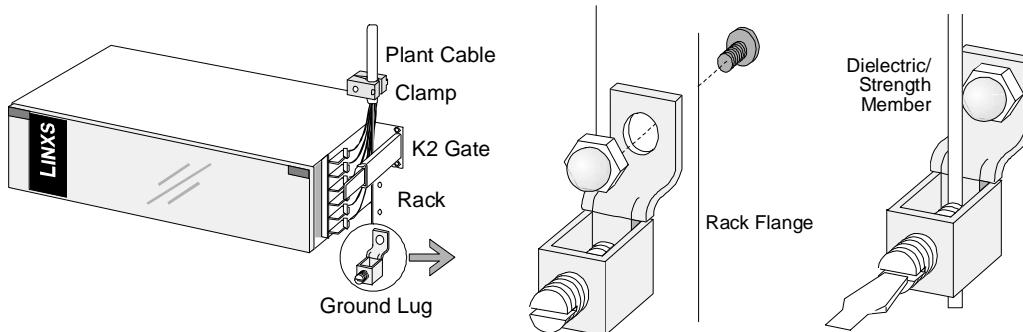
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Step	Action
1.	Remove 76" (193 cm) or more of the outer jacket and kevlar from the cable.
2.	Clean off the cable.
3.	If you are grounding the system to the front of the rack, cut off the strength member to 6" (15 cm) from the end of the outer jacket. If you are grounding to the rear of the rack, cut off the strength member to 16" (40 cm) from the end of the outer jacket.
4.	Bring the cable to the front or back of the panel, and secure it with a cable clamp.

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5. Attach a ground lug (provided in clamp kits) to the rack at least 5" (13 cm) from the clamp (front of rack shown).

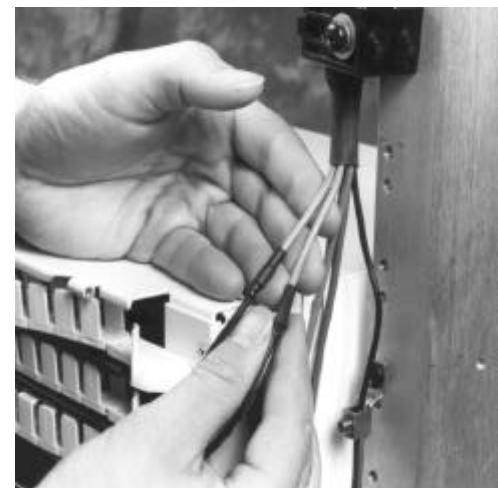


6. Insert the strength member into the ground lug, tighten the lug firmly, and cut off the excess length. ↗

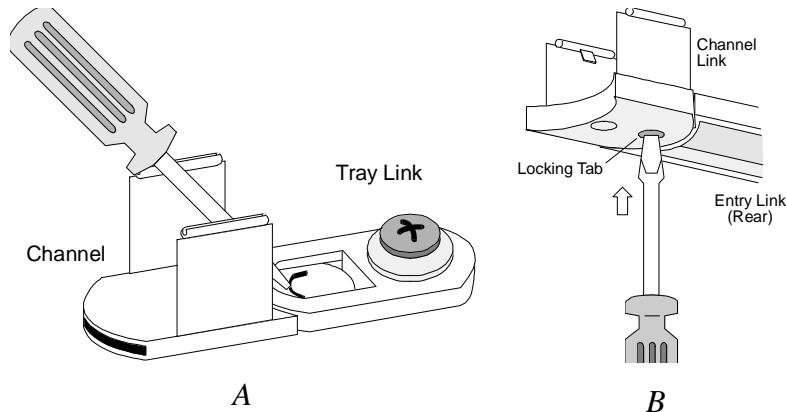
7. Remove the 6-foot length of flexible tubing and the K1 Gate Clips from the splice tray.

8. Outside plant cable requires the application of flexible tubing to the 6- or 12-strand fiber bundles in place of the stiffer buffer tube:

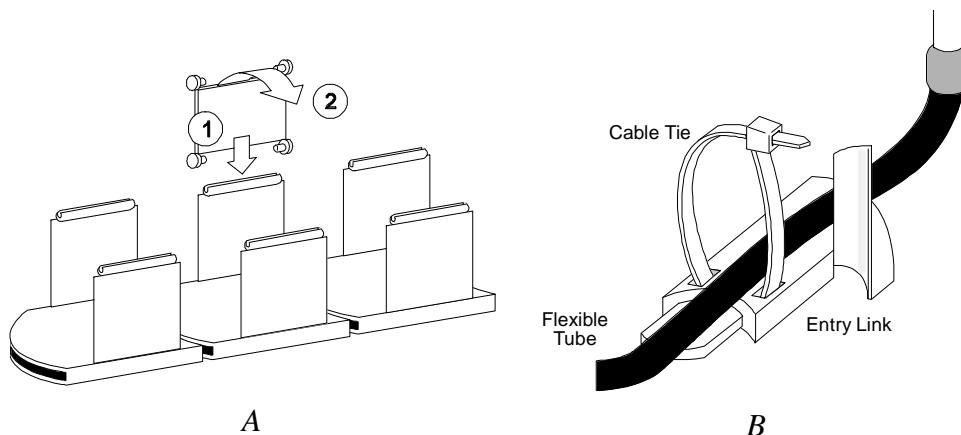
- Extend the buffer tube from the cable clamp to the Entry Link on the front corner of the LINXS shelf.
- Cut the buffer tube jacket 2 inches (5.1 cm) before the Entry Link and remove it from the cable.
- Clean the gel from the fiber strands and apply talcum powder, if desired, to reduce friction.
- Cut the flexible tubing in half.
- Feed the fiber strands through one piece (about 3 feet or 0.91m) of the flexible tubing.
- Slide the flexible tubing over the end of the buffer tube with 1/2" (1.5 cm) of overlap. The flexible tubing should fit tightly over the buffer tube. ⇒
- Optional*—Apply 3/8" (0.95 cm) heat-shrink tubing (not provided) to further secure the flexible tubing to the buffer tube.
- Repeat Step 8a through 8g for the second buffer tube. *However, do not repeat Step 8d* (do not cut the flexible tube in half again).



9. Remove both K1 Fiber Channels from the side of the tray.
  - a. With the tray open, detach the channels from their Tray Links by lifting up on the locking tab of each link with a small screwdriver and pulling off the channel. *See drawing A.*
  - b. Detach each channel from its Entry Link:  
Push a small screwdriver into the last small hole underneath the attachment point to release the locking tab, then pull the channel from the link. *See drawing B.*



- c. Remove the channels from the tray.
10. Place the flexible tubing containing the fiber strands into a K1 Fiber Channel, and attach K1 Gate Clips to one in every three or four links to secure the tubing within the channel. *See drawing A.*
11. Secure the flexible tubing to the front Entry Link with a cable tie threaded through the slots in the link. *See drawing B.*



12. Reattach the K1 Fiber Channel to the front Entry Link and the Tray Link.
13. Wrap the flexible tubing around the Fiber Routing Arcs several times in a figure-eight or circular pattern. *See photo A, next page.*

14. Cable-tie the tubing through the slots in the arcs. *See photo B.*

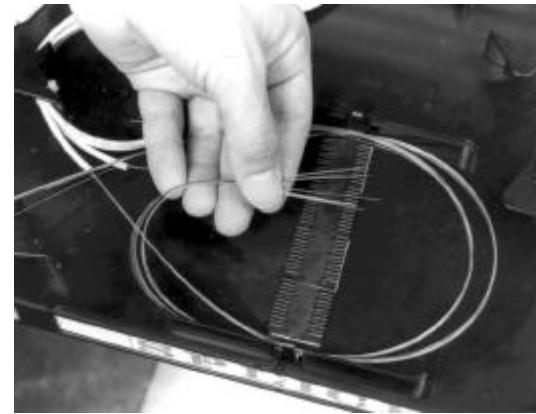


A



B

15. Wrap the bundle of fiber strands to be spliced clockwise around the splice pad area two or three times. This leaves enough fiber for repeated splice attempts and ensures proper bend radius. Wrap the bundle of fiber strands from the second buffer tube similarly, but counter-clockwise.  $\Rightarrow$
16. Repeat Steps 10 through 12 for the pigtails which enter the other side of the splice tray.
17. Route the pigtails across the first Fiber Routing Arc and secure them with a cable tie.
18. Flexible tubing is not needed for pigtails. However, remove the jacket from the pigtails where they extend beyond this cable tie point. *See photo A.*
19. Wrap the pigtail fibers around the routing arcs two or three times (to leave fiber for future splicing) in a figure-eight or circular pattern. *See photo B.*



A



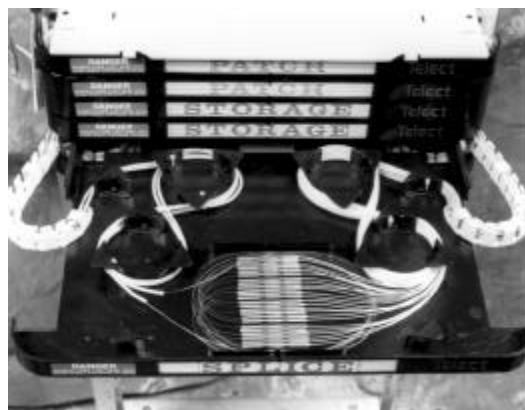
B

20. Now fiber can be spliced and stored:

*NOTE*

*From the rear of the splice pad to the front, each splice requires about 1/4" more fiber length than the previous one.*

- a. Guide two fiber strands into the rearmost splice position and adjust their length so that after being prepared, spliced, and wrapped, they will lie neatly across the splice tray.
- b. Remove the fiber strands to the splice table.
- c. Prepare the fiber, then splice according to the splice manufacturer.
- d. Place the completed splice into the splice pad.
- e. Repeat Steps a through d for the remaining splices, working forward from the rearmost position.
- f. After the splices are complete, wrap the slack fiber around the spools.

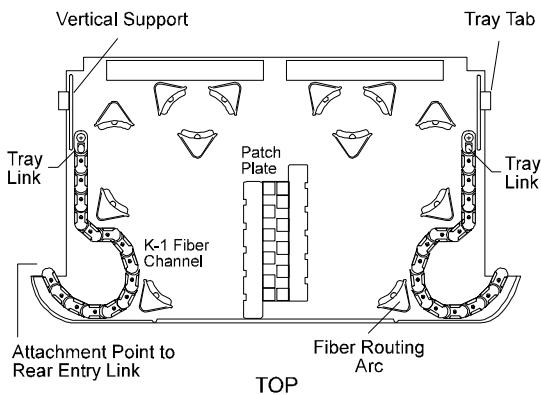


21. Secure the fiber strands to the Fiber Routing Arcs with cable ties through the slots in the arcs.
22. Identify each splice on the designation strip in the tray and/or on the strip on the front of the tray.
23. Replace the plastic splice compartment cover and close the splice tray.

## TFA Patch Tray Cabling (PN 026-0023-xxxx)

### NOTE

You can purchase LINXS patch trays with or without adapters. Specify adapters—Select stocks most of the industry standards—even when you order trays without them to ensure proper-sized mounting holes.



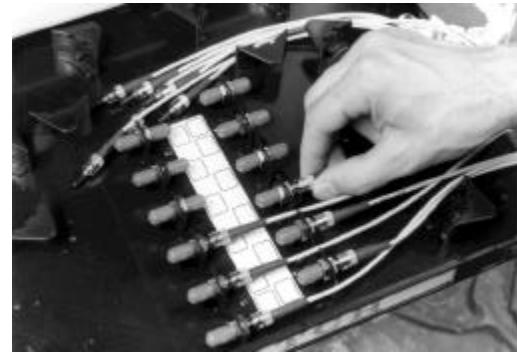

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Step	Action
1.	Open the patch tray.
2.	If adapters are installed, go directly to Step 3. To install adapters: a. Remove the four Phillips screws that secure the patch plate to the tray, then pull out the plate. b. Mount the adapters on both sides of the patch plate with the slots all facing upward. c. Secure the patch plate in the tray by reinstalling the four screws.
3.	Number or otherwise label the designation strip provided in the tray and place it as shown in <i>photo A</i> .
4.	Connect the pigtails or patch cords from one side of the tray to the adapters, beginning with the frontmost patch position. <i>See photo B.</i>

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A

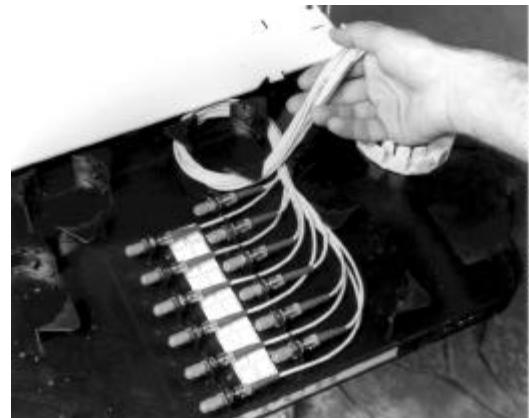


B

- Wrap the cables around the Fiber Routing Arcs and secure them in place with cable ties through the slots in the arcs.

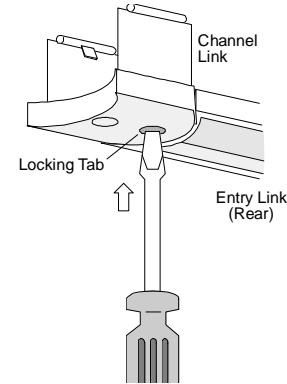
*NOTE*

*If a Fiber Routing Arc interferes with cable routing, it may be removed. Use a Phillips screwdriver to remove the screw holding the arc from underneath the tray.*



- Detach the channel from its Entry Link:

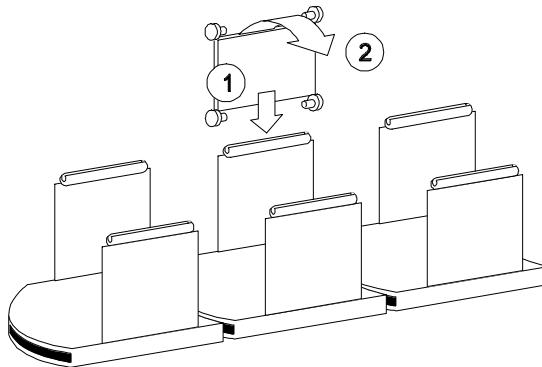
With the tray closed, push a small screwdriver into the last small hole underneath the attachment point to release the locking tab, then pull the channel from the link.



*NOTE*

*It is not necessary to remove this channel from the Tray Link in order to load the pigtails or patch cords on this side.*

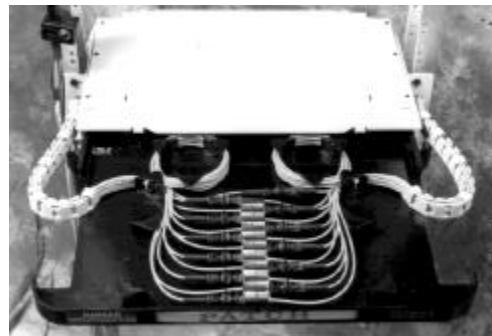
- Place the pigtails or patch cords from this side into the K1 Fiber Channel and attach K1 Gate Clips to one in every three or four links to secure them. ⇒



- Reattach the channel to the front Entry Link.
- Perform Steps 4 through 8 with the pigtails or patch cords on the other side of the tray.

A completely cabled patch tray looks like *photo A*.

10. Remove the designation strip from the front of the tray, identify each patch using either side of the strip, and replace the strip. *See photo B.*



A



B

11. Close the patch tray.

## Storage Tray Cabling (PN 026-0040-0000)

The LINXS storage tray can be used to store excess fiber cable and as a cross-over point for patch cords.

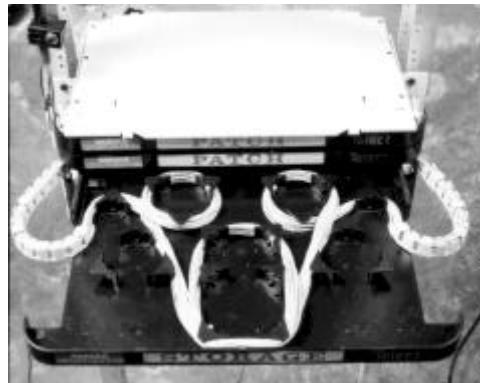
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Step	Action
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1. Open the storage tray.
2. Place the fiber cable into the K1 Fiber Channels.
3. Secure the cable in the channel using the K1 Gate Clips, provided with the tray, as needed.
4. Route the cables around the fiber routing guides to take up the slack. *See photo A on the next page.*

Many configurations are possible; *see photo B.*



*A*



*B*

5. Close the tray.